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AUTHOR Lynch, Robin
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ABSTRACT

This paper presents an argument that cooperative learning's effect on academic achievement is mediated by students' academic self-concept and academic goals as well as briefly reporting findings from an empirical investigation of the theories presented. The paper argues that the psychological processes produced by cooperative learning groups cause students to identify with the group of which they are a part. This identification affects the students' self-concept, so they come to define themselves in part as a member of the group. Research indicates that identification with a group results in the adoption of group goals or the group's expectations. Thus, it is argued that group expectations help determine individual goals, and individual goals affect the learner's ability to learn. The empirical investigation that supports these arguments involved a regression analysis, which used cooperative learning as the independent variable, student self-concept and student goals as mediating variables, and academic achievement as the dependent variable. The research shows that students who were more involved in cooperative learning classes had higher scores on a measure of student self-concept and that students' academic self-concept and the students' academic goals were positively related to academic achievement. Included are 6 tables, 2 flowcharts, and 19 references. (JB)

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COOPERATIVE LEARNING, SELF-CONCEPT AND ACADEMIC ACHIEVEMENT: A THEORETICAL ARGUMENT FOR SELF-CONCEPT AS MEDIATING THE RELATIONSHIP BETWEEN COOPERATIVE LEARNING AND ACADEMIC ACHIEVEMENT

BY

ROBIN LYNCH

U.S. DEPARTMENT OF EDUCATION
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Morton Deutsch, Director
Teachers College, Columbia University

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SUMMARY

The report presents an argument that cooperative learning's effect on academic achievement is mediated by student's academic self-concept and academic goals. Also, it briefly reports on findings from an empirical investigation of the suppositions described below.

It is argued that the psychological processes produced by cooperative learning groups cause students to identify with the group of which they are a part. This identification affects one's self-concept so that students come to define themselves in part as a member of the group. Research indicates that identification with a group results in the adoption of group goals or the groups' expectations for oneself. Group expectations, then, help determine individual goals. Individual goals affect the learner's ability to learn. Information that is clearly related to individual objectives is more readily assimilated than other information.

A regression analysis which used cooperative learning as the independent variable, student self-concept and student goals as mediating variables and academic achievement as the dependent variable provides support for these suppositions. The analysis showed that those students who were more involved in cooperative learning classes had higher scores on a measure of student self-concept. Additionally, both the students' academic self-concept and the students' academic goals were positively related to academic

achievement. Finally, the relationship between cooperative learning and academic achievement was not significant when self concept and student goals were entered into the regression equation first. That is, the mediating variables accounted for all of the variance in academic achievement.

The results suggest that it is the expectations of others that form the students' self-concept and individual goals and that these in turn affect the quality of students' learning. Promotively interdependent groups establish a social context that helps students to see themselves as academic achievers. To the extent, then, that self-concept facilitates the individual's ability to learn, cooperative learning, through its impact on interpersonal relationships, evidences hope for increased student achievement.

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Introduction

There is substantial evidence that cooperative learning significantly enhances academic achievement when compared with students' learning achievement in individualistic and competitive situations (Johnson and Johnson, 1989). It remains unclear, however, how this effect is achieved (Knight and Bohlmeyer, 1990). Results from research in several areas of social psychology suggest that the effect of cooperative learning groups that are promotively interdependent on students' educational goals may explain their enhanced academic achievement. Specifically, findings from (1) studies of the effects of positive interdependent relationships on students' identity, (2) investigations of the effect of interpersonal relationships on individual goals, (3) recently proposed models of learning from cognitive psychology and (4) investigations of the relationship between cognitive and motivational processes, serve to support this supposition.

This paper, first, summarizes the present findings from the research on the relationship between cooperative learning and academic achievement and, second, presents a theoretical argument that groups that are promotively interdependent influence academic self-concept and individual goals. Finally, I suggest how these may mediate the relationship between cooperative learning and academic achievement. I conclude with a proposal for testing these relationships.

Cooperative Learning and Academic Achievement

Findings on the Effects of Cooperative Learning and Academic Achievement

Major investigations of the effects of cooperative learning on academic achievement have shown that cooperative learning enhances academic performance. Johnson and Johnson (1989) described a meta-analysis procedure they conducted that reduced the 323 investigations on the subject reported since 1897 to a single analysis. They concluded that the average person in the cooperative learning setting performs at a level two thirds of a standard deviation above the average person in a competitive setting and three quarters above the average person in an individualistic setting. Furthermore, when these studies were limited to include only those that randomly assigned subjects to conditions, and in which the teacher and curriculum effects were controlled for, students' average performance was approximately four fifths of a standard deviation better than when compared to competitive and individualistic conditions. Finally, this analysis determined that "pure" forms of cooperative learning as opposed to mixed cooperative learning, individualistic and competitive methods proved significantly more effective in producing high achievement.

Also, in the same publication, the Johnsons report that they and several other investigators have found that cooperative learning structures affect the use of higher

that cooperative learning strategies affect greater use of (1) "process," which is the ability to generate new ideas and solutions using the material learned, (2) group to individual transfer, which is the ability to transfer what is learned in the group setting to individual learning tasks, (3) "quality of reasoning strategies," which is the ability to focus on underlying concepts between lessons and (4) elaboration and metacognition strategies, which are the ability to generate new ideas by relating new information to what is previously known.

The Johnsons conclude from their analysis that cooperative learning's effect on academic achievement is a function of the students' mastery of small group skills. That is, academic achievement is enhanced when the emphasis in small group learning is on working together to achieve common goals. To support this argument they maintain that their investigations indicate that positive results are obtained when cooperative learning groups are (1) clearly perceived as positively interdependent, (2) promote face to face interaction, (3) bring about felt personal responsibility, (4) augment the use of interpersonal and small group skills and (5) utilize regular and small group processing.

A second hypothesis concerning the relationship between cooperative learning and academic achievement comes from research done by Slavin. Graves (1990) and Knight and Bohlmeyer (1990) note that Slavin's investigations of the

effects of cooperative learning on academic achievement conducted in 1983 and 1990 show that the effect of cooperative learning on academic achievement is a result of the emphasis placed on individual achievement and cooperative task structure. Slavin's analysis of 46 studies that examine the effect of cooperative learning on academic achievement shows that many of the results are obtained only when their exists a cooperative task structure and a cooperative incentive structure for individual learning. Graves notes that the techniques Slavin has developed have shown to be effective in the acquisition of basic skills.

Sharan (1980) reviewed the results of investigations of cooperative learning's relationship to academic achievement. He notes that "group investigation" (G-I) methods in which students are involved in group projects and problem solving tasks that are intrinsically interesting to them develop higher order cognitive skills. These methods, he observes, require the particicipants attention to intragroup processes.

Knight and Bohlmeyer (1990) summarize various positions on the relationship between cooperative learning and academic achievement. They call for further investigations to clarify which variables mediate this relationship. They group variables that have been theorized to mediate the relationship between cooperative learning and academic achievement into five categories. These are: (1) social influences, (2) cognitive processing influences, (3)

academic task structure influences, (4) reward structure, and (5) participant role influences.

The authors conclude that the results of investigations of cooperative learning and academic achievement is unconvincing because of the methodological flaws extant in much of the research methods employed. For example, the Johnson's and Slavin's conclusions have been based on correlational analyses that have examined only the effects of different methods without controlling for competing explanations. Additionally, other research on the variables included in the five categories mentioned above demonstrate empirical evidence for the link between cooperative learning and the hypothesized mediating variable, but have shown only a theoretical link between the mediating variable and academic achievement. The authors conclude with a recommendation that investigations which attempt to identify the mediating variables between cooperative learning and academic achievement adhere to a four step procedure. They must demonstrate that (1) the independent variable accounts for a significant percentage of the variance in the dependent variable, (2) the independent variable accounts for a significant percentage of the variance in the mediating variable, (3) the mediating variable accounts for a significant percentage of the variance in the dependent variable and (4) the percentage of variance in the dependent variable accounted for by the independent variable drops

significantly when the dependent variable has been residualized by the mediating variable.

The investigations of cooperative learning and academic achievement, then, give substantial evidence of the positive relationship between these variables, but indicate uncertainty about what affects these results. For example, it is unknown the degree to which one's relations with other group members are responsible for the learning that is taking place. Knight and Bohlmeyer have outlined the methodology to investigate the relationship. What is needed is a hypothetical model that a explains this relationship and which yields statistically significant results when tested according to the methodology Knight and Bohlmeyer proposed.

Academic Self-concept as Mediating the Relationship Between Cooperative Learning and Academic Achievement

To establish the framework for the role of individual goals for determining cognitive processing and enhancing academic achievement I, first, describe how cooperative learning may affect individual goals. Then, I describe research from various areas of social psychology that shows the interpersonal nature of individual goals and how goals comprise the self-concept or self-system. Finally, I discuss what may be the relationship between individual goals and learning.

Cooperative Learning, Promotive Interdependence and Student Identity

Many of the instructional programs that emphasize student interaction in small groups to learn academic material, what is now commonly referred to as cooperative learning, are derived from Deutsch's (1949) theory of cooperation and competition. Deutsch's work is rooted in tenets of Kurt Lewin's theory of intrinsic motivation (1935) and field theory (1948). Lewin held that a state of tension within an individual motivates h/her to achieve desired goals. He hypothesized that individuals are made interdependent through their common goals.

Deutsch's theory examined how either cooperative or competitive goal structures affect behavior. His theory utilizes two concepts each of which exists on a continuum: promotive and contrient relationships and effective and bungling actions. The former refers to interpersonal relationships in which goals are linked so that if one member achieves their goals the others achieve theirs as well; the latter to interpersonal relationships in which the achievement of one person's goals necessarily means the others do not achieve theirs. Effective and bungling actions are actions that either assist or impair, respectively, one's opportunity to accomplish their goal.

Deutsch showed that the psychological condition of group members was affected by whether the group achieved goals through cooperative or competitive processes.

Specifically, three social psychological processes are affected by the degree of cooperation or competition in group processes: (1) substitutability, (the ability to let another's actions act for your own), (2) cathexis (investment of psychological energy in objects outside oneself) and (3) inducibility (the ability to be influenced by others.) In relationships characterized by positive interdependence, effective actions will be viewed as substituting for one's own, as positively cathected and will allow members to be influenced by one another. The theory predicts that in positive interdependent groups that experience ineffective actions the opposite effects will occur. By extension, reciprocal results for both conditions will be obtained in contrient interpersonal relationships.

The Johnsons developed their cooperative learning approach on the principle, demonstrated by Deutsch, that promotively interdependent groups, where members help one another to achieve common goals, will enhance individual learning. The Johnsons (1989) observe that one of the effects of promotive interdependent groups is that students come to identify themselves as a member of the group. Research suggests (Stryker, 1982) (Heise, 1987) that the processes Deutsch indicated cause students to identify with the group because (1) they facilitate students' role-taking and (2) because they bind members together emotionally creating common expectations as well as mutual respect for other members. The processes described, then, may explain

the Johnsons' finding that students' involvement in cooperative learning groups that are promotively interdependent causes them to identify with the group.

Below I describe theories that explain what may be the relationship between identity, self-concept and individual goals.

Interpersonal Relationships, the Self and Individual Goals

Identity theory

Identity Theory, (Stryker, 1982) posits conditions that affect group identity and notes the effect of group identity on self-concept and individual goals. The theory has its origins in tenets of symbolic interactionism and role theory. A basic assumption of these orientations is that behavior is a function of the expectations of others, which is determined by self and others through social interactions, and is manifested in the role one assumes in a group. Role theory maintains that roles become internalized by the extent to which they receive support from the group and the degree of the individual's commitment to the behavior it ascribes. Role identities can be thought of as "idealized self-conceptions" (Stryker and Statham, 1985; p. 346), and are a primary source of individual goals. The extent to which you identify with the group corresponds with the degree to which you assume these behavioral expectations for oneself.

Identity theory posits that a person's various conceptions of their "self" are hierarchically organized and situationally determined. The role one assumes depends upon the context and one's degree of commitment to the expectations for oneself implied by the role in that context. Identity theory maintains that identification with a group entails assuming a structured role relationship within that group that is determined in conjunction with other members. Based on the degree to which they identify with the group, the individual internalizes the assumptions and expectations the role assignment implies. In this formulation, then, the self we are most committed to is based on the degree of intensive and extensive social relationships built upon that role. Identity theory suggests that the quality of group interaction affects commitment to the group and that the degree of individual commitment determines role identity and individual goals.

Self concept and individual goals

Cantor and her colleagues present research on life tasks and individl goals that, they argue, evidences that the self-concept embodies individual goals, (Cantor et al., 1986). They observe that one's self-concept is derived from experiences with significant others, and it provides the means for individuals to have a unified, meaningful view of themselves. Within one's self-concept people develop their values, hopes and fears, their goals and their sense of

potential. The authors borrow from Adler's typology the term "life tasks." They argue that Adler's definition captures the meaning of individual goals in that it represents the behavioral expectations attributed to a particular "self." Their fulfillment is necessary to one having a meaningful view of themselves. Also, they correspond to Adler's definition of "style of life." Adler held that a person's style of life manifested people's personal management of life tasks given their commitment to one or another primary goal. Life tasks or individual goals, then, are determined through significant relationships and become the mechanism for maintaining one's sense of self.

Self-discrepancy theory

Higgins' self-discrepancy theory, (Higgins, 1989) posits that individuals are motivated to reach a condition where their actual self or "self-concept" matches their ought and idealized selves. These make-up, what the author designates as, "self-guides." They are determined initially by the individual's relationship with primary caretakers.

Higgins postulates factors that contribute to the "continuity" or "discontinuity " of primary self-relevant guides. He observes that self-relevant guides may be vulnerable to the norms represented in certain social conditions. As an example Higgins presents the importance of peer pressure for determining adolescent's behavior. He

notes that the peer culture frequently replaces original self-guides and becomes the adolescent's source of norms and standards.

Research in self-discrepancy theory, then, speculates on the importance of idealized and ought selves for determining individual goals and lends support to the idea that the social context can affect the self one is compelled to live up to.

Thus far I have reviewed how cooperative learning affects students' identity and have presented theoretical arguments that show how interpersonal relationships determine individual goals through their impact on the self-concept. In the following I describe what is suggested as the relationship between individual goals and the way people learn.

Goals and Learning

Recent findings in Cognition

Gagne (1985) describes the means by which people retain information and learn new material. She notes that the formulations of John R. Anderson presently govern our understanding of this area of cognitive psychology. Anderson and others present a model of learning that divides knowledge into either declarative or procedural types of information. Declarative knowledge, represented by propositions, is knowing that something is the case, whereas

procedural knowledge is knowing how to do something. Propositions are roughly equivalent to ideas. A proposition contains an argument, which is a topic, and a relation, which constrains the topic. Thus arguments tend to be nouns and relations are generally verbs, adverbs and adjectives. Propositions can only have one relation but they may have more than one argument. For example, the statement "Bill gave the car to Ellen" contains Bill, car and Ellen, but contains one relation, gave.

Research suggests that we store information as propositions. Gagne observes that we know that knowledge is represented in such a way that allows us to see its relationship to other "units" since the ability to make connections between these ideas is evident in problem solving and essential to intelligence. A useful way of representing these relationships is by propositional networks. Any two propositions that share meaning are related through this network.

Declarative knowledge is learned when a new proposition is stored with related propositions in the propositional network. It depends upon elaboration and the spread of activation, which is the ability of the new information to "cue the retrieval of related prior knowledge." Learning is facilitated by the extent to which new information is related to what is previously known and according to the strength of the associations made between prior knowledge and the new material. New information is assimilated by the

extension of propositional networks. In this formulation meaningless knowledge, or information the learner is not able to relate to, is difficult to assimilate.

Procedural knowledge is dynamic. It does not simply recall information, rather it transforms it. For example, a sum is the result of doing an addition problem. The input of the information is, say, two and two but the transformation of the information, here the sum, is four. Procedural knowledge, once learned, can be activated quickly where the activation of declarative knowledge is more conscious and deliberate. Procedural knowledge is thought to be contained in "productions" or "condition-action" rules where the actions of one production create the conditions for another to take place. The author presents this example of condition-action rules; "if a figure is three sided and the figure is two-dimensional and the figure is closed then classify the figure as a triangle and say triangle."

Acquisition of procedural knowledge occurs through either "pattern-recognition" or "action-sequence knowledge." The former is acquired through the process of generalization and discrimination which are procedures for applying information to a broader and narrower class of entities, respectively. The latter are learned through the processes of proceduralization and composition. Proceduralization translates declarative knowledge into procedural knowledge; composition transforms several small procedural steps into a unit that takes place automatically as a whole.

Srull and Wyer, (1986), argue that it is procedural knowledge that governs meanings and impressions formed in interpersonal relationships and that procedural knowledge is readily affected by individual goals. Their position is presented below in the following section.

Warm cognition

Higgins and Sorrentino (1986) argue that it is an individual's achievement motive that underlies cognition and behavior. The authors argue that the use of the n-achievement device has both consistently demonstrated the importance of motivation in the accessibility of individual constructs and has accurately predicted behavior. To support this proposition they present articles by several authors who have conducted research that provides both theoretical arguments and empirical evidence for the role of motivational processes in cognition and whose investigations have successfully linked cognition to behavior. Srull and Wyer's article exemplifies this thrust. Their article reviews evidence that individual goals mediate between cognitive processes and learning.

Srull and Wyer determined from their review of investigations of the effects of chronic and temporary goals on social information processing that information processing is a function of the associations the learner makes between incoming information and his/her needs and interests. They note that these findings should be applicable to academic

domains as well, given what is suggested as the social nature of academic material.

Srull and Wyer argue that procedural knowledge is primarily responsible for processing information about social conditions. That is, procedural processes are used to analyze and to identify social information. They note that investigations have shown that procedural knowledge is affected by (1) attentional and perceptual processes, (2) encoding and organizational processes, (3) storage and retrieval processes, (4) higher order and integration processes, (5) response selection processes and (6) affective and emotional processes. They note also that while the first five categories are typically classified as cold cognitive processes they are influenced by motivational processes.

Citing evidence for the first process they refer to Bruner's concept of "category accessibility." Bruner showed that categories of information were made more accessible when they coincided with temporary need states or with chronic states of the person. Bruner has also demonstrated that personal values have also been shown to affect category accessibility. Secondly, they refer to Klinger's work on "current concerns." Klinger 's research showed that "people become stimulated to goal related stimuli that are relevant to their current concerns," (p.506). Finally, they cite the evidence for the role of traits in attention and perception processing. A person who is "schematic" with respect to one

trait dimension will process information that is relevant to that trait more readily than one who is not. In the area of encoding and organization processes the authors cite research evidencing the role of goals as determinants of the amount of information encoded. Also, they report on research that shows that information is organized around an evaluative theme. For example, investigations comparing the effects of evaluative inconsistency compared with descriptive inconsistency showed that the former was more responsible for encoding information. Storage and retrieval processes are difficult to extricate from encoding and organizational processes. Goals affect these processes through through their affect on encoding and organizational processes. The authors report that although the relationship between judgement and retrieval is intuitively appealing it has little empirical support. It has been proposed that the distinction between retrieval and computational processes may explain this lack of significance. If information is related to a judgement decision and is retrieved through a "retrieval process" rather than computational processes there is no opportunity to reevaluate the information in light of one's present goals. Concerning the effects of processing goals on higher order judgement processes the authors note that subjects' goals are the means for organizing and remembering information and for making it meaningful. Once a judgement is made it is resistant to change. It is reasoned that a

reason for this resistance is interference from ego defense mechanisms that have been demonstrated to affect higher order judgement processes. Goals affect response selection in that the goal of the individual is to respond in a manner consistent with the other's expectations. There is evidence that this affects both the communicator's presentation and their own evaluation of the person in question. Finally, concerning the evidence for the impact of goals on affective processes the authors note that evidence suggests that negative affect caused by the inability to achieve one's goals causes one to account for their negative feeling and perhaps to eliminate it. Positive affect causes one to induce positive self-attributions respective of their ability to achieve goals.

Proposed Causal Model

I have described how cooperative learning groups affect a student's identity. As a result of their participation in cooperative learning groups that are promotively interdependent students come to identify themselves as a member of the group. I have presented theoretical perspectives that indicate that one's identity determines one's self-concept and individual goals. I have indicated how through the self-concept's impact on individual goals a student's identity may affect h/her ability to learn. It is suggested by these theories that a cooperative learning group leads students to identify with their group. This

identification causes them to develop a sense of themselves as academic achievers if the group's goal is to accomplish academic tasks. It is postulated that their identity as academic achievers, that is, their academic self-concept, causes them to formulate individual goals consistent with this self-concept. Based on prior research on the relationship between individual goals and information processing, information that is relevant to their achieving their academic goals should be readily assimilated. That is, the relationship formed between the student and academic tasks should facilitate the acquisition of academic information.

The relationship I am hypothesizing between cooperative learning, self-concept, individual goals and academic achievement is testable through path analysis, as suggested by Knight and Bohlmeyer (1990). It is predicted in this analysis that the degree of involvement in cooperative learning groups will be significantly related to academic achievement as well as to the students' academic self-concept. The students' academic self-concept will determine individual goals. Academic self-concept and individual goals will mediate the relationship between cooperative learning and academic achievement. Finally, when the variance from the mediating variables is accounted for, cooperative learning will not be significantly related to academic achievement. The outcome of the analysis described above is reported in the following section.

Methodology

Research Design

Path analysis was used to determine the degree of association between variables in the proposed causal model. The use of path analysis is recommended in analyses where diverse phenomena are predicted to determine the dependent variable, (Pedhazur, 1973). Also, it is recommended in investigations where theory determines the direction of causal relationships hypothesized by the model. That is, since path analysis is able only to determine the degree of association between variables the causal direction between variables must be determined theoretically, (Asher, 1988). Finally, the characteristics of the data used in this analysis met the assumptions required by path analysis. These are: (1) the relationships among the variables are assumed to be linear, (2) the residuals of endogenous variables are assumed not to be correlated with other variables and are expected to be randomly dispersed, (3) the variables are measured on interval scales and (4) the model is posited as recursive.

Subjects

The subjects in this study were 98 students from an inner city alternative high school. The teachers from this school participated in cooperative learning workshops and were introducing this method of teaching in their classrooms. 53 of the subjects were women and 45 were men.

Of the 98 students 49 indicated that they were Afro-American, 31 were Hispanic, 3 were Hispanic and Afro-American, 4 were white, and 1 was Asian-American. Ten students did not report their ethnicity. The final sample was comprised of 59 students. That is, of the total sample of 98 students 59 students had completed both sets of the evaluation questionnaire and had taken the Regency Competency Test, (RCT),[1] and were able to be used in the portion of the analysis that tested the effects of academic self-concept and students' academic goals on academic achievement. Twenty-four males and 35 females were in the final sample. Of the final sample 32 students indicated they were Afro-American, 19 were Hispanic, 2 were Afro-Americans and Hispanic, 1 was white and 1 was Asian.

Procedure

The school from which the subjects were drawn participated in this study voluntarily. Teachers attended after-school workshops designed to introduce them to the cooperative learning approach to education. A pretest and posttest version of a questionnaire was used to assess the impact of cooperative learning on the students. Questionnaires were approved by the New York City Board of Education and consistent with the Board's policy, students who were over eighteen signed a consent form indicating

1. RCT is a test of minimum standards required by the state in order for students to be awarded a high school diploma.

their willingness to participate in the study. Students' confidentiality was protected by assigning each participant an identification number.

Measurement Instruments

1. Student's exposure to cooperative learning. Students' "exposure" to cooperative learning was derived from the combination of the trainers' ratings of the teachers according to their degree of expertise in cooperative learning and the time each student spent with each teacher. Specifically, cooperative learning trainers were asked to rank teachers according to their "facility and expertise" with cooperative learning. The trainers' rankings were standardized and their scores for individual teachers were matched with the students who attended the classes of these teachers. This was done for the last three cycles[2] during which the intervention was introduced. Students' "exposure" scores were then able to be computed based on the class time spent with each teacher and the teacher's ranking.

The exposure measure described here differed in two ways from the exposure measure derived from teachers' self-report of the percentage of time they used systematic cooperative learning. First, the trainers' rankings exposure measure allowed all of the teachers to be included in the analysis. This improved substantially the number of students able to be included in the analysis since only

2. The school year is broken into four terms referred to as "cycles."

about half of the teachers self-report measures were available. Second, the measure provided an assessment of the "expertness" with which the teacher was implementing cooperative learning. It assessed, then, not only the quantity but the quality of cooperative learning to which the students are being exposed.

2. Academic self-concept. A student's academic self-concept measure was developed for this study. Items on the questionnaire related to academic self-concept were factor analyzed. These consisted of 10 Likert-type items answered on either four or five point scales. These items are shown in Table 2. Factor I of this analysis revealed loadings of .40 or better for items that measured the degree to which students "get excited" about learning. Factor II revealed the students' evaluation of their academic ability and their need to do well in school work. Items from Factor II were used for this analysis since these operationalize academic self-concept as it is conceptualized in this analysis. These items asked the students to evaluate themselves on the degree to which they believed others saw them as a good student and on whether they viewed themselves as being able to get good grades. Items were coded so that the higher the score meant more of the construct was represented. The sum of the scale items comprised each student's score on this construct. The factor loadings for these items are shown in Table 1.

3. Academic Goals. A measure of students' academic goals was also created by a factor analysis of students' responses to items on the questionnaire related to academic goals. These consisted of eight items answered on six, five and four point Likert-scales. The analysis of the items in this category showed two underlying factors: Factor III - students' concern with future job position and performance after graduation and Factor IV students' concern with their academic performance. Items that loaded on Factor III were used to create the students' academic goals variable because they were theoretically consistent with the ideas being tested in the model. That is, it is predicted that cooperative learning influences students' plan for the future. Scale items were, again, coded so that a higher score meant that more of the construct was represented. The sum of the four items weighted most heavily on Factor III comprised each student's score on this construct. The factor loadings for these items are shown in Table 1.

4. Academic Achievement. Academic achievement was measured by the students' scored on the Regency Competency Tests, (RCTs). The average of the students' scores on the math, reading, history, science and global studies portions of the RCTs were used to assess academic achievement in this analysis.

Analysis Plan

First, descriptive statistics were computed for the measures in the study and secondly the reliability of each

was determined. Finally, the causal relationships predicted by the model were investigated using path analysis. Regression analyses were used to quantify each linkage in the model in terms of path coefficients. A test of the model was done by examining the reproduced correlation matrix and by performing a goodness of fit test. Finally, the model was tested on subgroups to see whether gender or ethnic differences influenced results.

Results

Descriptive

Table 2 documents the possible and observed scores and the means, median and standard deviations for the measures used in this study. These statistics and an examination of frequencies for these variables show that scores were not evenly distributed, but rather tended to cluster around the mean. Additionally, the full range of possible scores was not realized. Finally, the small range of scores tends to yield less variance, and the standard deviations remain small. Additional analysis show that each of the items generate small variances accounting for the unsatisfactory amount of variance in the scales. These results indicate that these measures are not capturing sufficient diversity among the sample population. This should be considered in evaluating the overall results.

Reliabilities

Internal consistency for all measures was estimated using Cronbach's coefficient alpha. For the academic self-concept scale scores ranged from .51 to .72 . Hispanic and Afro-American females represented the low and the high end of these reliabilities scores, respectively. The reliability scores ranged from .50 to .82 for the goals scale. Afro-American males represented the low end of this range indicating less consistency in responses to these questions for this group. Hispanic males represented the high end of the scale indicating a great deal of consistency in their responses on this construct. Reliability on both measures for the total sample as well as for the various subsamples on which the model was tested are reported in Table 3.

Causal Relationships Among Variables in the Model

As discussed path analysis was used to determine the association among variables hypothesized by the model. Path analysis is a series of regression analyses that generates for each hypothesized link in the model a coefficient that represents the quantitative measure of improvement in the fit of the model as a result of its inclusion. Each endogenous variable in the model, then, is regressed on the variables preceding it (see figure 1). The calculations for

determining the association between variables is represented in Table 4.

The use of path analysis requires that certain assumptions about the characteristics of the data be met. A examination of scatterplots of the variables ascertained the linear relationship between variables and that the residuals of the endogenous variables were independent. As previously demonstrated, the variables were measured on interval scales and finally, as indicated in the model the relationships hypothesized are recursive.

The results of the analysis as described in table 5 will be discussed in terms of the specific relationships suggested by the model.

The Impact of Cooperative Learning on Students' Academic Self-Concept It was hypothesized that the student's adoption of the group's academic goals would cause students to internalize a sense of themselves as academic achievers. The analysis supported this proposition. The variance explained by the variables was significant.

The Impact of Cooperative Learning on Students' Academic Goals. It was hypothesized that the academic group goals established in cooperative learning would cause students to adapt more advanced educational goals. To test this proposition students' academic goals were regressed on exposure to cooperative learning. The analysis of the total population of students evidences a trend in this direction but the results are not significant.

Impact of student self-concept on student goals. It was hypothesized by the model that student self-concept would be positively related to students' academic goals. This proposition was tested by regressing student goals on student self-concept. Student self-concept, as expected, predicted a significant amount of the variance in student goals.

Impact of self-concept on academic achievement. The model predicted that student self-concept would be associated with students' academic achievement. To test this proposal academic achievement was regressed on student self-concept. Student self-concept, as hypothesized, predicted a significant amount of the variance in academic achievement.

Impact of Student Goals on Academic Achievement. It was hypothesized that the students' more academically oriented goals would enhance academic achievement. Evidence of the goal determined nature of cognitive processing suggests that the adoption of academic goals would affect their ability to learn new information. The amount of variance explained by regressing academic achievement on students' goals was significant.

The Direct Effect of Cooperative Learning on Academic Achievement. Academic Achievement, regressed on cooperative learning, explains a statistically significant amount of the variance of academic achievement. When the effects of

cooperative learning on academic achievement are controlled for by academic self-concept and educational goals the amount of variance explained is reduced to a non-significant amount.

Test of the model on various subgroups. A test of the model was conducted to examine whether gender or ethnic identity influenced results. Further analysis was done to see whether gender within each of these subpopulations affected results. These tests of the model yielded little new information. Minimal confidence can be placed in these results, however, since the N that resulted from subdividing the total sample was quite small.

Adequacy of the Model

The adequacy of the model was assessed by performing a goodness of fit test. In this test, a ratio between the squared multiple correlation for the observed relationships and the squared multiple correlation obtained through path analysis is determined. The results may range from zero to one with one representing a better fit of the model. The ratio obtained was .70 indicating satisfactory support for the model. The procedure and the results of this analysis are reported in Table 6.

The final model was found to be underidentified by the standard test (i.e. order, rank condition). This indicates

the need for additional independent variables to be included in future studies.

Discussion

The following briefly reviews some salient points about the reported findings. It was the purpose of this study to address a need in cooperative learning research to demonstrate "what mediates" the positive relationship between cooperative learning and academic achievement. It has been suggested that path analysis (Sharan, 1990) is an appropriate investigative technique for discerning this relationship. An important reason for using path analysis is that it reveals the difference in the ability of the independent variable to predict the dependent variable when the mediating variables are added to the model.

It was hypothesized that the effect of cooperative learning on students' academic goals and students' academic self-concept would explain the relationship between the intervention and academic achievement. The investigation supported these suppositions. Cooperative learning explained a significant part of academic self-concept and academic self-concept explained a significant part of students' academic goals. Both of these variables explained a significant part of academic achievement.

There are both theoretical and statistical shortcomings to this investigation. The model does not account for the many influences affecting student behavior. Several

competing explanations could be hypothesized to explain these results. Factors in the social context and in individual differences suggest rival hypotheses. Also, teachers who used cooperative learning more skillfully and more readily than others may be better teachers generally. That is, more skillful teachers may customarily produce students who have a sense of themselves as academic achievers with high academic standards. To test this alternative hypothesis a correlational analysis was performed on years of teaching and on the degree to which teachers were "burned out," with expertise of teachers on its use as rated by the trainers. Although neither of these correlations were statistically significant these variables may not represent quality of teaching.

Additionally, the finding that identity affects individual goals is incongruent with research that demonstrates that change of this nature is a function of the individual internalizing new information (Kelman, 1958). Kelman distinguished between identity and internalization. He provided empirical evidence that the former is a function of group pressure to accede while the latter occurs when there is a match between an individual's attitudes and beliefs and the information being learned. Kelman's position, however, appears to ignore the subtle influence of social expectations on individual beliefs and values. Ross and Nisbett (1991) write that as exemplified in the fundamental attribution error frequently we attribute to the

individual characteristics that are a result of the social context. Also, the degree to which students internalize rather than identify with the group's norms and expectations may not be that distinct given what is the nature of group processes in cooperative learning groups. That is, individual goals change as much as a result of one's input to the group as they do to the groups' expectations generally. That is, one's own input makes up an important part of the groups' norms and expectations for group members.

Concerning the statistical results the model is underidentified. That is, while the results reported here supported the predicted results, there is not sufficient evidence these would be replicated with another population. This suggests that the model would benefit from the inclusion of additional variables (Asher, 1983).

Another variable suggested by the theoretical positions presented here might be the attitude of teachers toward the importance of interpersonal relationships in the learning process. Teachers who emphasized cooperative relationships between the teacher and students and the student with other students in the learning of academic material might help to support the findings of this model. Self-discrepancy theory (Higgins, 1989) suggests that it is the teachers' attitude on this dimension that mitigates the affect of ought and should selves in the learning process.

Should, however, the relationships between cooperative learning, student self-concept, academic goals and academic achievement be causally related for the reasons hypothesized here the model should be investigated further to see whether these ideas support the inclusion of other variables that are known to affect academic achievement. Should the model support the inclusion of other variables the ideas presented here may contribute to our understanding of social factors that affect academic achievement.

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Table 1

FACTOR ANALYSIS

Academic Self-concept Scale

Item loadings	Factor I	Factor II
I feel excited about learning.	.91028	.21833
How strongly do you agree with the statement "I like school."	.7400	.01026
It is important for me to do well in my school work	.70960	.12030
How important is it for you to get good grades?	.19149	.10062
How do you rate yourself at getting good grades?	.15603	.81830*
How do others see you as a student?	.16019	.73824*
I get discouraged with school work.	.30862	-.54522
How important is what other teachers think of you?	.06678	.44030
How important is getting job training and experience?	.18532	.03192
How do others see you . . . as a troublemaker?	.00950	.01298

All items were scored so that the higher the score the more of the construct it represented.

Factor I: Students' excitement about learning.

Factor II: Students' academic self-concept.

* = items used to create scale

Table 1 (continued)

Student Academic Goals Scale

Item loadings	Factor III	Factor IV
What is your best guess as to the chances that you will apply to college?	.82850*	.11430
How much education do you think you will eventually have?	.77728*	.09171
What are your plans after leaving Satellite?	.71688*	.10671
How important is it for you to continue your education?	.54365*	.54052
What is your best guess that you will drop out of high school temporarily?	.36155	.66597
What is your best guess that you will drop out of high school permanently?	.11405	.71290
How important is getting good grades to you?	.01979	.65999
Do you expect to graduate from Satellite Academy with a diploma?	.10859	.45073

All items were scored so that the higher the score the more of the construct it represented.

Factor III: Students' concern with future.

Factor IV: Students' concern with their academic performance.

* = items used to create scale

Table 2

DESCRIPTIVE STATISTICS FOR STUDY MEASURES AND RANGE OF POSSIBLE SCORES

Scale	Possible Scores	Observed Scores	Scale Midpoint	Mean	SD
SCHSELF	1-6	2-4	3.5	3.23	.624
How do others see you as a student? How do you rate yourself at getting good grades?					

Scale	Possible Scores	Observed Scores	Scale Midpoint	Mean	SD
GSCALN	1-6	2-5.25	4.0	3.81	.76
What is your best chance that you will apply to college? How much education do you think you will eventually have? What are your plans after leaving Satellite? How important is it for you to continue your education?					

Note:

Schself: Students' perception of self as student

Gscaln: Students' academic goals

Table-3

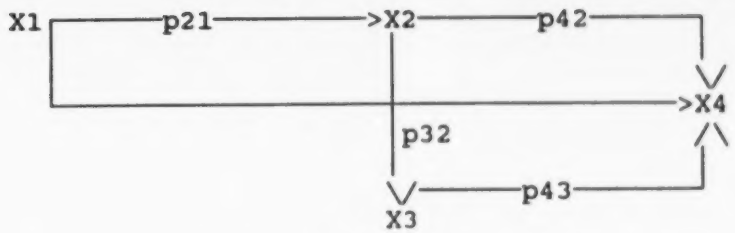
SCALE RELIABILITIES FOR TOTAL SAMPLE AND FOR SAMPLE SUBGROUP

	Total	M	F	H	AA	HM	AM	HF	AF
SCHSELF	.64	.65	.62	.62	.69	.69	.66	.51	.72
GSCALN	.67	.66	.64	.81	.57	.82	.50	.75	.58

Males (M)	N=48
Female (F)	N=64
Hispanic (H)	N=37
Afro-Americans (AA)	N=59
Male Hispanics (MH)	N=16
Female Hispanics (FH)	N=21
Male Afro-Americans (MA)	N=27
Female Afro-Americans (FA)	N=32

Table 4

STRUCTURAL EQUATIONS



$X_2 = p_{21}X_1 + e_2R_2$

$X_3 = p_{32}X_2 + e_3r_3$

$X_4 = p_{43}X_3 + p_{42}X_2 + p_{41}X_1 + e_4r_4$

X1: exposure to cooperative learning

X2: students' academic self-concept

X3: students' academic goals

x4: academic achievement

Table 5

INDIVIDUALIZED STRUCTURAL EQUATIONS FOR PREDICTIONS OF COOPERATIVE LEARNING ON STUDENT'S EDUCATIONAL GOALS, ACADEMIC SELF-CONCEPT AND ACADEMIC ACHIEVEMENT

Independent/ Dependent Variables	R	R2	F	B	t	sig t
Expose/ Schself	.316	.10	10.68	.316	3.3	.0015
Schself/ Gscaln	.40	.16	24.51	.403	4.9	.0000
Schself	.45	.20	7.49	.325	2.5	.01
Gscaln	.40	.16	11.26	.403	3.3	.0014
Expose/ RCT	.46	.22	5.25	.115	.916	.36

Expose: exposure to cooperative learning
Schself: perception of self as student
Gscaln: academic goals
RCT: Regency Competency Test

Table 6

Goodness of Fit Test

R^2m Generalized Squared Multiple Correlation for fully recursive model with all the variables linked (ratio of the explained variance to be explained.

M Equivalent of R^2m for an overidentified model.

df Equal to the number of overidentified restrictions.

Q Goodness of fit (value between 0 and 1; if closer to 1 the better the fit.)

$$R^2m = 1 - (1-R_1^2)^2 \ (1-R_2^2)^2 \ \ldots . \ (1-R_p^2)^2$$

$$R^2m = 1 - (.89985) \ (.70156) \ (.83735) \ (.7919) \ (.78021)$$

$$M = 1 - \underset{(.70156)}{(1-R_1^2)^2} \ \underset{(.83735)}{(1-R_2^2)^2} \ \ldots . \ \underset{(.78021)}{(1-R_p^2)^2}$$

$$Q = \frac{1 - R^2m}{1 - M} \qquad \frac{1 - .67339}{.63704} = .51$$

Figure 1

CAUSAL MODEL

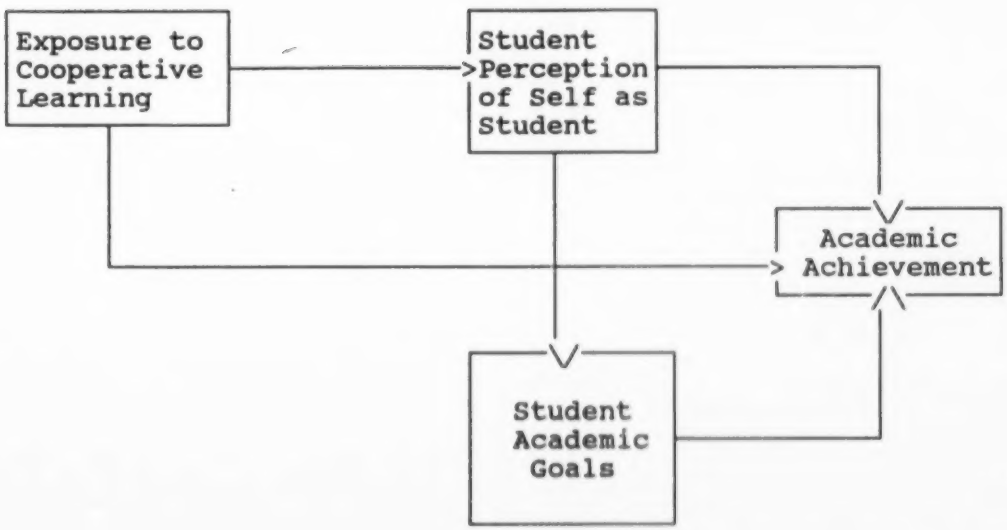


Figure 2

CAUSAL MODEL